

## **REMARKS**

### **Overview**

This amendment accompanies a request for continued examination. Claim 6 is currently pending and rejected. Claim 6 has been amended and claims 7 and 8 are new. No new matter has been added.

### **Claim 6 Objection and 35 U.S.C. § 112 Rejection**

Claim 6 has been objected to in paragraph 2 of the Office Action due to an informality relating to the product surface. Applicant has amended claim 6 to overcome this rejection. Therefore, the objection should be withdrawn.

Claim 6 has been rejected under 35 U.S.C. § 112, first and second paragraphs, due to the "winding" limitation. Applicant has changed "winding" to --bending-- which is supported in the specification. See the published application 2005/0142294 at paragraph 9. Therefore, this aspect of the § 112 rejection is moot.

The Examiner also questions the degree that the product is wound on the mandrel, such as 100%, 10°, 90°, etc. However, the degree of bending on the mandrel is not critical, since a degree of bending merely is a function of the length of the coated product. Claim 6 only requires that the product be bent on the mandrel without breaking the coating, but does not require the full length of the product to be so tested.

The Examiner has also questioned the thickness of the substrate and the thickness of the coating. Again, these factors are not critical to Applicant's process, which can be used with various substrates having different thicknesses, and with different thickness coatings dependent upon bath time.

The Examiner also states that the mandrel material will affect the mandrel test results. However, Applicant does not understand this assertion by the Examiner, since it is the diameter of the mandrel about which the coated product is bent which tests the coating. Whether the mandrel is made of plastic, metal, wood, or some other composition is irrelevant to the bending test.

Therefore, Applicant respectfully requests that the § 112 rejection of claim 6 be withdrawn.

### **Claim 6 Obviousness Rejection**

Claim 6 has been rejected under 35 U.S.C. § 103 as being obvious over the Rallis patent, as modified by the Japanese '213 patent. Applicant respectfully traverses this rejection and requests reconsideration of claim 6, as amended.

Claim 6 has been amended to provide that the product is plunged into the aluminum melt for a period of 70-80 seconds. This bath time is supported in Tables 1 and 2 of the specification, and thus does not constitute new matter.

The Rallis patent requires a minimum of 5 minutes, and more preferably 30-120 minutes of bath time so as to achieve the desired metal interdiffusion of the steel and aluminum and so as to maintain the desired strength characteristics of the coated product. See Rallis Abstract; col. 2, lines 34-51; col. 3, lines 60-62; and Examples I and II. Rallis explains that the bath time can be reduced with increased bath temperatures. See col. 4, line 47 - col. 5, line 30. Thus, to achieve interdiffusion in two minutes, a temperature of 2000° F (1093° C) is necessary. See Rallis col. 4, lines 60-61. This bath temperature far exceeds Applicant's temperature of 660°-680° C, as provided in claim 1, for a similar period of time. On the other hand, using Applicant's

temperature range of 660°-680° C (1220°-1250° F) Rallis' optimum temperature range of 1000°-1341° F requires a bath time of 40 minutes to two hours. See col. 5, lines 12-15 and Examples I and II. The Japanese '213 patent does not provide any time periods for the melt bath, and thus does not overcome the deficiencies of Rallis.

Attached is a Rule 132 Declaration of Dr. Gerald S. Frankel, Professor of Materials Science and Engineering at The Ohio State University. Dr. Frankel, a well-published expert on corrosion, has reviewed the present application, the Rallis patent, and the Japanese '213 patent cited in the rejection of claim 6. Dr. Frankel explains in paragraph 3 of his Declaration that the present application is directed towards a method of applying an aluminum alloy coating to iron and steel products at a relatively low melt temperature, with a goal of good adhesion and ductility. As described in paragraph 4 of the Frankel Declaration, Rallis is directed towards a method of aluminizing steel to form an intermetallic layer while maintaining high strength in the coated product. As further explained by Dr. Frankel, strength and ductility are inversely related in metallurgy (see paragraph 6). Accordingly, the high strength of the Rallis aluminized product also means that the product is brittle due to the low conductivity (see Frankel paragraph 6). In comparison, Applicant's aluminum alloy coating provides increased ductility compared to Rallis (Frankel paragraph 6).

Frankel concludes that in his opinion, it would not be obvious to modify the Rallis aluminizing process so as to have a bath time of 40-120 seconds (which includes the time limitation of claim 6) at a temperature between 660°-680° C. Dr. Frankel reaches this conclusion because such a modification would not achieve the metal interdiffusion, which is a goal of Rallis (see Frankel paragraph 7). Dr. Frankel notes that Rallis requires more than 5 minutes to achieve

the desired interdiffusion of the aluminum and steel, which is about 5 times longer than the 70-80 second period of claim 6.

The Frankel 132 Declaration is strong evidence of non-obviousness, and is not contradicted by Rallis or the secondary Japanese patent.

Therefore, the § 103 obviousness rejection of claim 6 should be withdrawn.

### **New Claims 7 and 8**

New independent claim 7 is similar to claim 6, except that the bending step has been eliminated. For the reasons stated above with respect to claim 6, claim 7 distinguishes over the cited references so as to be allowable.

New independent claim 8 is similar to claim 7, except that the temperature range has been changed to 650°-680° C, and the time period for the melt plunge has been changed to 70-120 seconds. These expanded time and temperature ranges are supported by Example 2 of the Specification, and therefore do not constitute new matter. As discussed above with respect to claim 6, Rallis does not meet the time limitations of claim 8, and any modifications to Rallis to use a shortened melt or bath dip time would defeat or preclude the steel and aluminum interdiffusion objective of Rallis, as explained in the Frankel Rule 132 Declaration. Therefore, claim 8 distinguishes over the cited references so as to be allowable.

In view of the foregoing, Applicant respectfully requests that a Notice of Allowance be issued.

## Conclusion

This amendment accompanies the filing of a Request for Continued Examination (RCE). Please charge Deposit Account No. 26-0084 the amount of \$405.00 (small) for the RCE per the attached transmittal.

This is a request to extend the period for filing a response in the above-identified application for three months from May 23, 2010 to August 23, 2010. Applicant is a small entity; therefore, please charge Deposit Account No. 26-0084 in the amount of \$555.00 to cover the cost of the three-month extension.

No other fees or extensions of time are believed to be due in connection with this amendment; however, consider this a request for any extension inadvertently omitted, and charge any additional fees to Deposit Account No. 26-0084.

Reconsideration and allowance is respectfully requested.

Respectfully submitted,



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Attachment: Rule 132 Declaration of Dr. Gerald S. Frankel